

Remarks

By their amendments, the applicants have encased the deleted Claim and Figure numbers in double brackets as requested by the Examiner and the cancelled claim numbers have had a strike through inserted. The applicants have also attended to the formal matters. In particular in the proposed drawing correction the drawings have been amended to more clearly show the legends in Figures 5a, 5b, 6a, 6b, 7a, 8a, 9a, and 10a. The title has been amended to that proposed by the Examiner.

Errors in the specification have been corrected. In particular the drawing references from Figure 4 onwards were one number too high in the body of the specification. This was an erroneous carry-over from a previous draft of the application. The description in the Brief Description of the Drawings was correct. Other minor errors have been corrected.

The claims have been defined to more clearly define the invention, and in particular the optimization steps required to produce high quality films (see, for example, the passage commencing at line 22, page 29, and going on to page 30, which explains how the system can be considered a five-dimensional space with only the fourth independent variable being varied and the observed film characteristics are observed to optimize the films.

The Examiner has recognized that the application relates to the production of optical quality silica films for use in waveguides and like devices. The presence of absorption peaks in the wavebands of interest negatively impact on the optical properties of the device. As explained in the specification, these absorption peaks typically arise as a result of contaminants formed during the PECVD deposition process. The object of the invention is to obtain a silica film wherein as far as possible these contaminants are eliminated. In the prior art one method was to subject the films to a high temperature anneal at a temperature of about 1350°C. This anneal creates its own problems, and the invention permits high quality films to be produced when subjected to lower temperature post-treatments, preferably 800°C.

The extensive studies carried out by the applicants and described in the lengthy specification show that if the gas flow rates are fixed, particularly good results are obtained if the total pressure is maintained between 2.0 and 2.6 Torr (see, for example, Figure 6b). The problem is that there are so many process variables that potentially one can play with in order to control the reaction, the number of possible combinations is very high. One skilled in the art could make an infinite number of adjustments with no certainty of success. Some might give improved results. Some might give worse results. The person skilled in the art would essentially have to make random trials over a very large number of possible permutations.

What the applicants show is that the significant parameter affecting the quality of the films is the total gas pressure and that the flow rates have relatively little impact. Thus, by fixing the flow rates and varying the total gas pressure between within the desired range it is possible to identify the total gas pressure that results in optimum quality films. This optimization step only requires a manageable number of steps and as explained in the specification will permit the production of high quality films that do not require an anneal at a temperature above 1200°C, and which in practice can produce good quality films with the aid of a post-deposition anneal at a temperature as low as 800°C..

The prior art does not show the sequence of steps now recited in claims 1 and 21. Shioya has nothing to do with the deposition of optical quality films. The post deposition heat treatment suggested in this patent is purely for the purposes of observing the cracking resistance of the deposited films. While this patent may have had accidental relevance to the original claims, it is not believed relevant to the amended claims. It does not disclose the optimization steps now claimed.

Neither Ojha nor Bouffard discloses the optimization method claimed wherein the gas flow rates are predetermined and then the optimum total pressure within the specified range is determined in the manner claimed. The Examiner cites Law as disclosing optimization (see foot of page 11 of the office action). However, Law (see col. 3, lines 2 – 5), just makes the general statement that the process variables can be optimized. This

may be a truism, but in practice the question is how to achieve optimization in a meaningful and orderly manner. The problem is that, as pointed out earlier, in a PECVD process there are many process variables that can be changed, and a person skilled in the art would encounter an endless variety of permutations. The invention puts some order into this jumble of possible variations by establishing that by fixing the flow rates and adjusting the total deposition pressure within the specified range it is possible to produce silica films of high optical quality because the absorption characteristics of the films are heavily dependent on the total pressure. This fact is not taught in the prior art.

It is clear that the prior art does not in reality teach the present invention, which in practice represents a very significant step forward in the art. In the absence of the teachings of the specification, one skilled in the art would not know that improved optical quality films that did not need a very high temperature anneal could be produced by carrying out the specific steps claimed. The criterion for obviousness is not whether one skilled in the art could practice the invention, but whether in practice one would do so, whether one would be motivated to do so in the absence of the applicant's teachings. It is not permissible to use the applicant's own teachings as blueprint for reconstructing the invention from the prior art. In the applicant's respectful submission there is no reason to suggest that one skilled in the art would be motivated to carry out the specific steps now set forth in the claims, and in particular claims 1 and 21 with the expectation of obtaining any useful results.

With regard to double-patenting objections it is noted that the present application has an earlier filing date than the cited pending applications. Consideration will be given to filing a terminal disclaimer during the prosecution of the later-filed applications should that be deemed necessary. It is respectfully submitted that it is not necessary to file a terminal disclaimer in respect of the present application since it prior dates the earlier applications and will inherently expire before them, and furthermore that the claims as amended are patentably distinct from the cited applications.

Reconsideration and allowance are respectfully requested.

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Respectfully submitted,

A handwritten signature in black ink, appearing to read "Richard J. Mitchell", is written over a horizontal line.

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Amendments to Drawings

Permission is respectfully requested to amend Figures 5a, 5b, 6a, 7a, 8a, 9a, and 10a of the drawings as shown in the attached copy. The legends have been redrawn to make them not blurry.

The drawings have also been labelled "Replacement Sheet".